Journal of Alpine Research | Revue de géographie alpine

96-2 | 2008
Connaissances en mouvement : expériences et propositions

Knowledge Transfer Services

A Second Order Communication process

Albert Simard

Electronic version
URL: http://journals.openedition.org/rga/464
DOI: 10.4000/rga.464
ISSN: 1760-7426

Publisher
Association pour la diffusion de la recherche alpine

Printed version
Date of publication: 15 June 2008
Number of pages: 20-29
ISBN: 978-2-200-92501-7
ISSN: 0035-1121

Electronic reference
Albert Simard, « Knowledge Transfer Services », *Revue de Géographie Alpine | Journal of Alpine Research* [Online], 96-2 | 2008, Online since 04 March 2009, connection on 02 May 2019. URL : http://journals.openedition.org/rga/464 ; DOI : 10.4000/rga.464

Knowledge Transfer Services

A Second Order Communication process

Albert Simard

Introduction

1 Information and knowledge are important aspects of the Government of Canada's vision for the next generation of public services (Canada, 2005). Yet, there are no generally accepted definitions or even descriptions of public-sector information and knowledge services.

2 In a knowledge economy, long-term success depends on an ability to create and use knowledge faster than competitors (Kay, 1993; Amidon, 1997; Nonaka, 1998: Davenport, 1998). Similarly, to remain relevant, governments must be able to create, use, and transfer knowledge in social domains such as health care, education, and national security (Holmes, 2001; Sinclair, 2006). Thus, creating and using knowledge will be central to sustaining success in the 21st century, in both the private and public sector.

3 Knowledge is transferred through information and knowledge markets that have been described by a number of authors (Stewart, 1996; Bryant, 2006; Simard, 2005). The purpose of such markets was variously described as enabling, supporting, or facilitating the mobilization, sharing, or exchanging of information and knowledge among individuals or groups who had it and those who needed it. These models focus on the transactional aspects of such markets – that is the processes through which content is transferred from providers to users. They can be viewed as passive delivery models: "if you build it, they will come." They do not consider how content comes into being, how it becomes available for transfer, nor how it is used to achieve sector outcomes or societal benefits. Such proactive processes are central to S & T departments, in particular, and government, in general.

4 The concept of knowledge transfer through services would seem to address these questions. However, Webster's dictionary contains 10 definitions of knowledge and 20 definitions of service. Multiplying ambiguity times itself yields ambiguity squared.

Consequently, knowledge services is used to mean virtually anything. For example, of the first 100 Web sites listed by Google (on April 3, 2007) containing the term "knowledge services," 66 non-redundant organizational sites were classified into 24 subject areas, indicating highly diverse use of the term. Subject groups included business applications and information technology, followed by learning, investment, governance, networking, libraries, and miscellaneous. Virtually all sites describe knowledge services specifically in the context of their business or mandate.

5 One way of bringing order to this emerging concept is to view knowledge services as the top level of a three-tier hierarchy of knowledge management.

- Knowledge management links the generation of knowledge (e.g., from science, analysis, learning) with its internal use by organizational programs (e.g., policy development, reporting, program management).
- Knowledge organizations create, manage, use, and transfer knowledge-based content, products, assistance, and solutions in the form of knowledge services.
- Knowledge services influence sector outcomes (e.g., global competitiveness, environmental stewardship) and benefits for citizens (e.g., well-being, fulfilled needs) within the context of knowledge markets.

6 In terms of influencing sector outcomes, the Weaver-Shanon communication model of the flow of information from transmitter to receiver provides a metaphor for the transfer of knowledge from source to final use (Weaver and Shannon, 1949). Their three levels of communication are:

A. Transmission: How rapidly and accurately can symbols be transmitted ? For services, this is comparable to provider/user market models, in which the objective is simply to deliver services.
B. Semantics: How accurately do the transmitted symbols convey the intended meaning ? For services, this relates to classifying clients and adapting services to their needs and capacities.
C. Effectiveness: How well does the received meaning influence actions ? For services, this relates to using services to achieve individual benefits or sector outcomes.

7 The model described here identifies, describes, and defines internal processes involved in generating and horizontally managing knowledge services. It also considers each level of external "communication" by identifying and describing: A) processes involved in transferring knowledge services from providers to users; B) users and uses of knowledge services; and C) intended benefits and outcomes of use.

8 The purpose of this work is to increase our understanding of knowledge services provided by government departments. Increased understanding will enable measurement and, ultimately, management of the process. The central hypothesis is that it is possible to develop a logic model or framework for knowledge services by eliciting tacit knowledge through dialogue among a group of experienced science managers. This paper describes the model developed through this process.

Methods

9 Natural Resources Canada established a Knowledge Services Task Group to "Examine the nature of the work of science and science-related programs in Natural Resources Canada, describe appropriate elements in the context of Government of Canada Service

Transformation, and submit a report." Group members were experienced scientists, science managers, or policy analysts from the Canadian Forest Service, Earth Sciences, Energy, and the Metals and Minerals sectors of Natural Resources Canada (Simard et al., 2007).

10 In establishing the task group, it was assumed that knowledge services could be described and defined well enough and measured with sufficient accuracy and resolution to manage the process. The Task Group Report provides considerable detail on knowledge services and the knowledge services system that provides the basis for the model described in this paper.

11 A systems approach was used to develop a logic model. The model is, therefore, less rigorous than one based on scientific proof (which is impossible) or empirical evidence (which does not exist). Conversely, it is more rigorous than one based on personal opinion or belief. The model represents consensus among a group of six experts with a combined total of 190 years of experience in conducting and managing science, which lends a degree of credibility to the final result.

12 Task Group members had an ability and willingness to "think outside the box" and a capacity to adapt to a complex, unknown, and constantly evolving structure. The challenge was to discover patterns and understand processes in a system that has not heretofore been described as an identifiable entity in the real world. To understand knowledge services, the group integrated many processes across the organization, the sector, and society, that collectively transform the outputs of science into benefits for society.

13 The objective was not simply to achieve consensus, but also to understand by eliciting tacit knowledge from participants. Thus, when a sense of discomfort was expressed with a term, definition, or structure, the dialogue continued, even though the individual could not explain the problem. Ideas built on each another, taking twists and turns, exploring new approaches. Sometimes a solution revealed itself during the discussion and sometimes it was left as an open question, with a solution surfacing days or even weeks latter. In many cases, it was found that unexplainable problems resulted from incorrect or incomplete logic, descriptions, or definitions.

14 The dialogue took place during a 16-month period in weekly sessions of 1-1/2 hours each. This kept the discussions fresh and incorporated "soak time" which frequently yielded new insights. Discussions proceeded in a hierarchical sequence from the system and its subsystems, through stages and components, to detailed sub components and individual elements. The resulting model is described in this paper.

15 Five case studies from Natural Resources Canada were conducted to determine the range of applicability of the knowledge services framework for managing knowledge services: Canadian Wildland Fire Information System, Geoscience Data Repository, Atlas of Canada, National Forestry Database, and International Clean Energy Decision Support Centre (Simard et al., 2007).

Knowledge value chains

16 Value chains are well understood in the private sector as production or distribution channels. They describe a sequence of steps in which inputs are transformed into increasingly refined and higher-value outputs and eventually sold to consumers. For

example, a tree is cut into logs, which are transported to a mill, where they are sawn into rough lumber, which is milled into finished lumber, which is transported to a distributor and then to a retailer, where it is sold to a consumer. Each step in the chain adds value through production or distribution, some of which can be extracted as profit.

17 Business strategies often focus on moving up a value chain to be closer to the consumer. For example, a manufacturer may bypass wholesalers and retailers by selling products directly to consumers on line. For the government, a value chain represents a series of steps in which knowledge services are provided and used, resulting in a sequence of changes, that ultimately yield results for Citizens. Government-On-Line (Government of Canada, 2006) is an example of moving up a value chain by communicating directly with citizens who are connected to the Internet.

18 A content value chain (Fig. 1) is the flow of content through a sequence of stages in which its form is changed and its value or utility to users are increased at each stage. In the content value chain, objects are measured to yield data; the meaning of data is interpreted as information; information is synthesized to yield knowledge, and finally experience and judgement yield wisdom, which enables the correct application of knowledge.

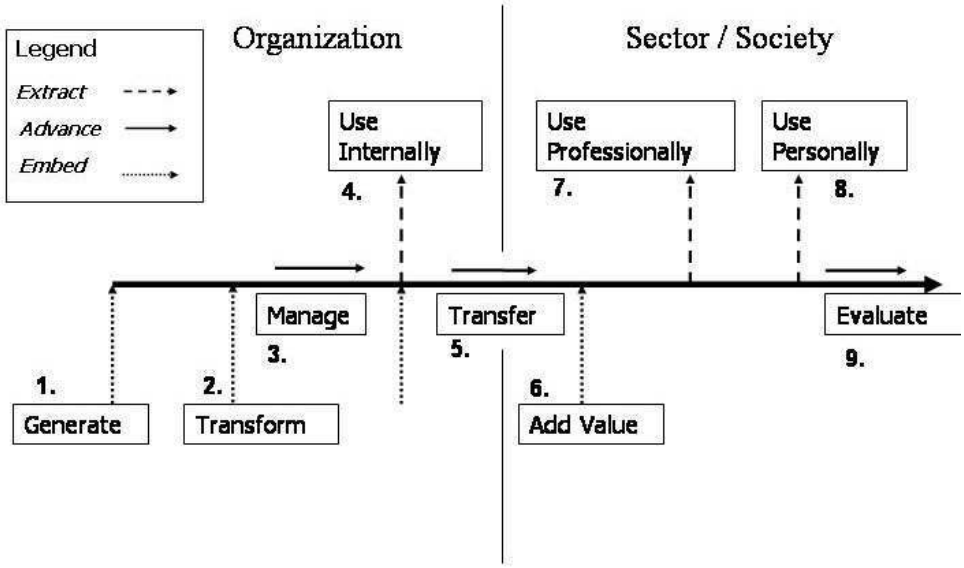
Figure 1. Content Value Chain

19 In general, as content moves “downstream” along the value chain, its value and utility increase. Moving downstream involves knowledge work and associated costs, which presumably reflect increased value of the content produced at each stage. Thus, the further “upstream” one has to move to solve a problem, the greater the cost. Science is an exception to this linear flow, in that scientific knowledge arises from analysing data and the knowledge is then transformed into information, in the form of publications.

20 A knowledge-services value chain (Fig. 2) is the flow of knowledge services through a knowledge services system in which value is embedded, advanced, or extracted by the organization, sectors, and society.

21 The knowledge-services value chain includes nine stages: generate, transform, manage, use internally, transfer, add value, use professionally, use personally, and evaluate. As with the content value chain, downstream services generally have higher embedded value than upstream services.

Figure 2. Knowledge Services value chain.



22 The following statements explain the purpose of each stage of the knowledge services value chain.

1. Generate – Content with intrinsic value and potential utility must be generated as the first stage of the knowledge services value chain.
2. Transform – Content is transformed into products and services to increase its utility or value to users.
3. Enable – The flow of knowledge services must be managed to permit their internal use or external transfer.
4. Use Internally – Knowledge services are used internally to accomplish organizational objectives.
5. Transfer – Knowledge services must be transferred to intermediaries, clients, and individuals to enable external use.
6. Add Value – Work is done by intermediaries to increase the availability, utility, or value of knowledge services.
7. Use Professionally – Knowledge services are used by clients with sector-related knowledge to benefit an identifiable sector.
8. Use Personally – Knowledge services are used by individuals to realize personal benefits.
9. Evaluate – The system is evaluated to improve its performance in supplying or fulfilling demands of knowledge markets.

23 Transfer (stage 5) primarily involves intellectual rather than physical property (even though it may be in the form of a publication or CD-ROM). It is useful to consider how intellectual property rights to organizational outputs are transferred from an organization to the sector and society. Three types of work are involved.

- Transact: Conduct or carry out business to enable the transfer of rights and limits to use, reuse, or redistribute outputs from the organization to intermediaries, clients, or individuals. (e.g., give, license, sell)
- Interact: Enhance the capacity, readiness, or willingness of intermediaries, clients, or individuals to understand and apply outputs to solve their problems. (e.g., promote, explain, support).
- Transfer: Deliver, distribute, or disseminate outputs to intermediaries, clients, or individuals (e.g., publish, disseminate, send). Transfer may be via any or all of several electronic or physical channels: on-site, off-site, kiosk, mail, on-line, e-mail, or telephony.

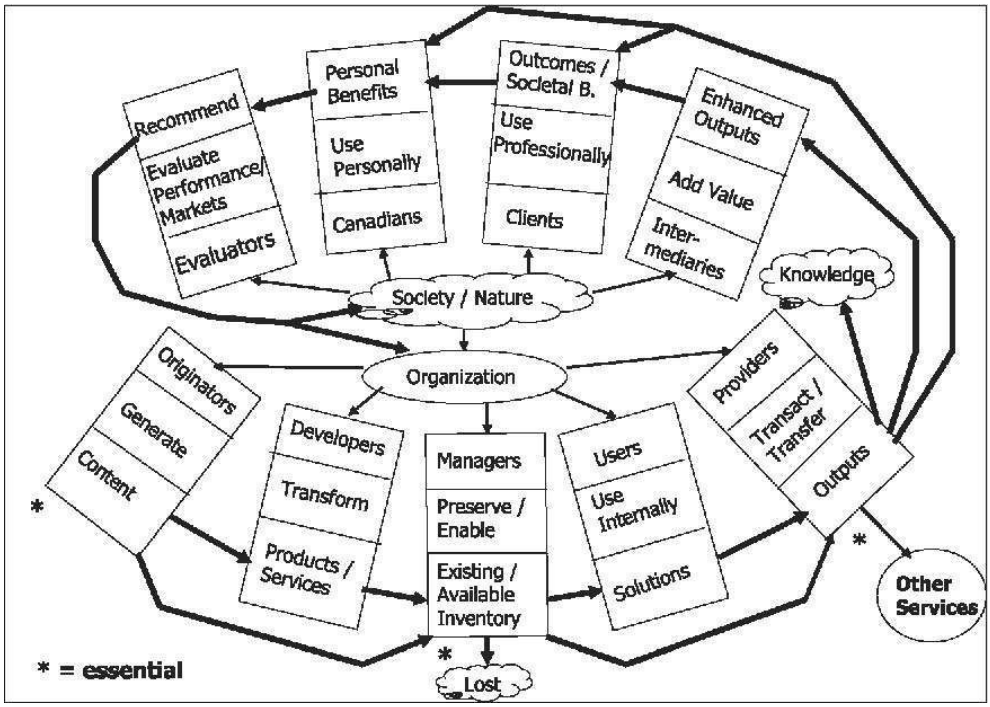
Knowledge services system

24 A "knowledge services system" provides the underlying infrastructure and processes that support the knowledge services value chain and, ultimately, knowledge markets. Yet, a knowledge services system does not actually exist as an identifiable entity in the real world. It is an artificial construct that combines many components and flows across organizations, sectors, and the society they serve. Although driven by organizational mandates, it has no place in the organization chart and no line item in the budget. That it has not been previously identified as an entity partially explains why no one has previously described what it does. Yet, to understand, measure, and manage knowledge services, we must bring together in one place all of the many pro-cesses that collectively transform organizational outputs into benefits for citizens and customers. We have to be able to "heat water at one end and see steam coming out at the other."

25 We begin by bending the knowledge services value chain into a loop so that it closes on itself, forming a circular flow (Fig. 3). We then use a framework of Who is Working on What to define three types of components for each stage. The purpose of each stage has been described in the previous section.

- Who: Persons, groups, or organizations who do knowledge work.
- Work: Processes, activities, or actions that embed value into, advance value, or extract value from knowledge services.
- What: Inputs to and outputs from each stage of the knowledge services value chain.

Figure 3. Knowledge Services System



Delivery richness spectrum

26 Figure 3 shows that a knowledge organization may distribute outputs and provide services to five destinations. These destinations can be thought of as regions of a delivery richness spectrum. Like colors in the electromagnetic spectrum, we can name segments of the richness spectrum, even though we cannot precisely define boundaries between them: unique, complex, technical, specialized, simplified, and manda-tory (Table 1). Note that Canadians are split into simplified and mandatory in Table 1. As with a blue-green color, sub-regions can also be identified. For example, university professors need both concepts and management practices while high-school teachers do not need professional knowledge, but they require more than a casual acquaintance.

27 Table 1 lists seven attributes associated with each region of the richness spectrum: system destination, audience size, market segmentation, architecture, difficulty of understanding, level of interaction, and use along with one example of an output. Each type of output is generally intended for one region of this spectrum. The terms used in each box are not categorical; rather, they are intended to show a progression from one end of the richness spectrum to the other. Although appropriate channels vary across the spectrum, channel is not included as an attribute because of significant overlap between adjacent regions.

Table 1a. Rich Zone of the Service Delivery Spectrum

	Unique	Complex	Technical
Destination	other services	knowledge	intermediaries
Audience	one	few	few
Market	customized	specialized	tailored
Architecture	none	formats	specifications
Difficulty	complex	conceptual	complicated
Interaction	intervene	support	promote
Use	particular	research	enhancement
Example	question & answer	scientific articles	product specifications

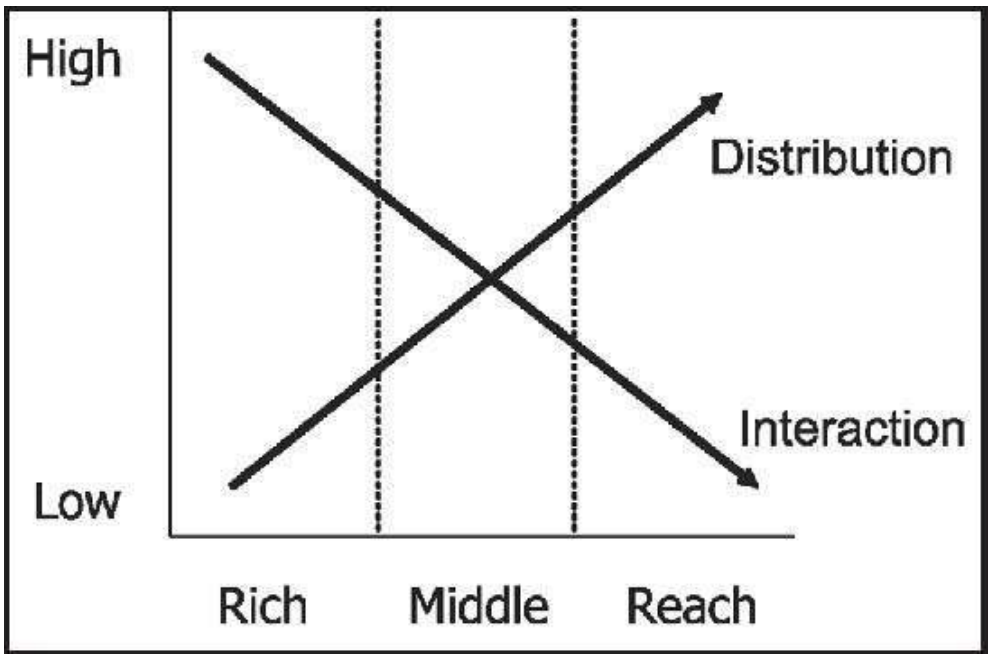
Table 1b. Reach Zone of the Service Delivery Spectrum

	Specialized	Simplified	Mandatory
Destination	practitioners	customers	all residents
Audience	some	many	all
Market	sector	categories	mass
Architecture	domain	standards	common
Difficulty	professional	popular	fool-proof
Interaction	explain	advertise	provide
Use	management	interests	instance
Example	consultation & advice	self-help guides	forms & instructions

28 This framework does not preclude someone with a personal interest (e.g., someone who is sensitive to pollution) from acquiring professional- or richer-levels of understanding. The key point is that in producing content, an organization may assume a level of understanding appropriate to the richness region. Similarly, because all citizens or customers may access and use content in their areas of interest, content needs to be popularized and disseminated, but it does not have to be provided at the same level of simplicity and accessibility as content that all residents must access and use.

29 The spectrum can be divided into three zones: rich, middle, and reach (Fig. 4). Two opposing processes take place across the richness spectrum: distribution and interaction. At the rich end of the spectrum, distribution to one or a handful of users requires minimal effort while interaction in the form of conversations is critical to knowledge transfer. Conversely, at the reach end, distribution to millions of individuals requires substantial effort while significant personal interaction is infeasible. In Table 1, audience, market, and architecture are distribution processes while difficulty and interaction are interaction processes.

Figure 4. Service Delivery Richness Spectrum Processes



30 The flow to other services is at to the "rich" end of the spectrum because it tends to be unique. It is often intended for one or two persons, is specifically tailored to a particular use, and is often transferred through dialogue involving questions and answers. The most appropriate delivery channels are face-to-face conversations or telephone calls. Next, complex content flows to the pool of knowledge. It is generally conceptual in form and is transferred to scientists conducting research in related areas through scientific articles. Here, published papers and presentations at scientific fora are typically used.

31 In the middle zone, technical outputs are destined for a few intermediaries who add value in a variety of ways (e.g., customize, innovate, simplify, analyse) and advance the enhanced content towards the reach end of the spectrum. Technical specifications, computer code, and blueprints are frequently used for this transfer. Continuing, specialized content is transferred to a broader group of practitioners through advice and recommended management practices to achieve sector outcomes. This may be done through professional publications, workshops, or field demonstrations.

32 Approaching the "reach" end of the spectrum, many individuals use simplified outputs, such as self-help guides to realize benefits in areas of personal interest. The Web and popular articles are particularly useful for reaching this category of users. The reach end of the spectrum is the domain of government agencies who are mandated to interact with all residents, regardless of their interests. Although the Web may be used here, mail is the only channel that is guaranteed to reach all residents.

33 A key strategic decision for any organization is the positioning and distribution of its mix of services to various users along the delivery richness spectrum.

Conclusions

34 This paper describes a knowledge services model developed by Natural Resources Canada. The model increases our understanding of how government departments develop and

provide science-based services. It also explains the sequence of processes through which organizational knowledge is transformed into benefits for citizens. Five successful case studies suggest that the model should be applicable to knowledge services provided by a broad range of government organizations.

35 The knowledge services model provides a strategic framework for understanding the complex relations between a public-sector knowledge organization and the socioeconomic environment within which it function. It traces the flow of knowledge services from their original generation through their final use to provide benefits for individuals, sectors, and society. Overall, the descriptive model provides an adequate framework to support measurement and subsequent management of knowledge services as a system.

36 The model provides a number of insights about knowledge services.

1. Knowledge services are much richer and more complex than simply transferring knowledge from providers to users.
2. Content flows through a sequence of stages along a value chain in which its form is changed and its value or utility to users are increased at each stage.
3. Knowledge services flow through a value chain in which value is embedded, advanced, or extracted at each stage.
4. The knowledge services system comprises nine stages: generate, transform, manage, use internally, transfer, add value, use professionally, use personally, and evaluate.
5. Knowledge services are delivered through a delivery richness spectrum.

37 Each region of the spectrum has a set of attributes that influence how services should be delivered.

BIBLIOGRAPHY

AMIDON D., 1997. – Innovation Strategy for the Knowledge Economy. Butterworth-Heinemann, Boston, MA., p. 136.

BRYANT J., 2006. – "Knowledge Management: The Ethics of the Agora or the Mechanisms of the Market". In proceedings, Hawii International Conference on Systems Science 39, Jan. 4-7.

CANADA, 2005. – Next Generation Public Services, Government of Canada 2005 Service Vision. Unpublished draft report, March 29. Treasury Board Secretariat, Chief Information officer Branch, Ottawa, ON, 16 p.

DAVENPORT T., PRUSAK L., Working Knowledge Harvard Business School Press. Boston, MA, 199 p.

HOLMES D., 2001. – E-Gov — e-business Strategies for Government. Nicholas Brealey Publishing, London, UK, 330 p.

KAY J., 1993. – Foundations of Corporate Success: How Business Strategies Add Value. Oxford University Press. Oxford, UK.

NONAKA I., 1998. – “The Knowledge Creating Company”. In Knowledge Management. Harvard Business School Press, Boston, MA, p. 21.

SINCLAIR N., 2006. – Stealth KM: Winning Knowledge Management Strategies for the Public Sector. Butterworth-Heinemann. Boston, MA, 219 p.

STEWART T., 1996. – Intellectual Capital: The New Wealth of Organizations. McGraw-Hill. New York, NY, 278 p.

SIMARD A., 2005. – “Global Disaster Information Network”. In UN World Conference on Disaster Reduction. Kobe, Japan. Jan. 18-22, 18 p.

SIMARD A., BROOME J., DRURY M., HADDON B., O’NEIL R., PASHO D., 2007. – Understanding Knowledge Services at Natural Resources Canada. Natural Resources Canada, Office of the Chief Scientist, Ottawa, ON, 80 p. Available Online: http://bookstore.cfs.nrcan.gc.ca/detail_e. php ? recid = 12586752, Canada, 2006. Government On Line 2006. Treasury Board, Government On Line Secretariat, Ottawa, ON, Dec. 23.

WEAVER W., SHANNON C., 1949. – The Mathematical Theory of Communication. Univ. Illinois Press, Urbana, IL.

ABSTRACTS

This paper describes a model intended to increase understanding of how content is transferred from its source to its use. A Natural Resources Canada task group explored the nature of knowledge transfer with a services paradigm to discover and understand underlying patterns and processes. Knowledge Services are programs that produce and pro-vide content-based organizational outputs with embedded value that are intended to be used internally or transferred to meet external user wants or needs. Model design criteria include independence from content, an organizational focus, scalability, two drivers, and two levels of resolution. The model is based on a value chain in which value is embedded, advanced, or extracted. A knowledge services system comprises nine stages: generate, transform, manage, use internally, transfer, add value, use professionally, use personally, and evaluate. Knowledge services are delivered through a delivery spectrum ranging from rich to reach. Each region of the delivery spectrum has a set of attributes that influence how services should be delivered.

Le présent article décrit un modèle visant à faciliter la compréhension du processus de transfert du contenu depuis sa source jusqu’à son utilisation. Un groupe de travail de Ressources naturelles Canada a étudié la nature du transfert des savoirs à l’aide d’un modèle de services, afin de découvrir et comprendre les modèles et processus sous-jacents. Les services de savoir sont des programmes qui créent et fournissent des produits organisationnels basés sur un contenu et ayant une valeur intégrée. Ces programmes sont destinés à être utilisés en interne ou transférés pour répondre aux souhaits et besoins d’un utilisateur externe. Les critères de conception du modèle sont les suivants : indépendance par rapport au contenu, concentration sur l’organisation, évolutivité, deux pilotes et deux niveaux de résolution. Le modèle est basé sur une chaîne de valeur dans laquelle la valeur est intégrée, déplacée ou extraite. Un système de services de savoir se divise en neuf étapes : générer, transformer, gérer, utiliser en interne, transférer, ajouter de la valeur, utiliser professionnellement, utiliser personnellement et évaluer. Les services de savoir sont fournis par l’intermédiaire d’un spectre de distribution allant de complexe à accessible. À chaque région du spectre de distribution correspond une série d’attributs qui influencent la manière dont les services sont fournis.

INDEX

Mots-clés: gestion du savoir, services de savoir, marchés du savoir, communication, chaîne de valeur
Keywords: knowledge management, knowledge services, knowledge markets, value chain

AUTHOR

ALBERT SIMARD

Knowledge Strategies Natural Resources Canada.
simarda@inspection.gc.ca